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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

PATENT APPLICATION

Eduard Sackinger

CASE 8

Serial No. 09/498559 **Group Art Unit** 2816

Filed February 4, 2000

Examiner D. Le

Title Active Inductor

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Enclosed is an amendment in the above-identified application.

NO ADDITIONAL FEE REQUIRED

In the event of non-payment or improper payment of a required fee, the Commissioner is authorized to charge or to credit **Deposit Account No. 12-2325** as required to correct the error.

Respectfully,

Eugene J. Rosenthal, Attorney
Reg. No. 36658
732-949-1857.

Date: April 11, 2003

Docket Administrator (Room 3J-219)
Lucent Technologies Inc.
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Tamika R. Gatson Date April 11, 2003

#23 Response 4/24/03 ajs

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Inventor(s): Eduard Sackinger
Case: 8
Serial No.: 09/498,559 **Group Art Unit:** 2816
Filed: February 4, 2000
Examiner: D. Le
Title: Active Inductor

THE COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON, D.C. 20231
SIR:

RESPONSE

This communication is in response to the Office Action dated December 23, 2002.

Remarks

Claims 1-19 are pending in the application.

Claims 14-19 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 6,069,516 issued to Vargha on May 30, 2000.

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vargha in view of United States Patent No. 6,028,496 issued to Ko et al. on February 22, 2000.

Each of the various rejections and objections are overcome by amendments that are made to the specification, drawing, and/or claims, as well as, or in the alternative, by various arguments which are presented.

The form PTO-326 has box "2a) This action is **FINAL**" checked. However, at the top of Examiner's remarks it states "**NON-FINAL REJECTION**". Applicant believes that the latter is correct and that this action is not final, given that this is a first action in response to an RCE and the fact that one prior ground of rejection was overcome. If applicant's belief is incorrect, applicant respectfully requests that applicant's undersigned representative be so advised immediately, so that applicant may take any necessary steps to insure that the application does not become abandoned.

Rejection Under 35 U.S.C. 102

Regarding the rejection under 35 U.S.C. 102 over Vargha, the Office Action indicated that applicant's argument that the circuit of Vargha does not operate as an inductor is not persuasive, because, according to the Office Action, the circuit of Vargha has the same structure as the claimed circuit which comprises a transistor being biased by a voltage beyond the power supply voltage supplied at the first terminal and the second terminal of the transistor. Thus, concludes the Office Action, the circuit of Vargha inherently operates as an inductor.

Applicant respectfully traverses this ground of rejection for the following reason.

The Office Action's circuit analysis and conclusion that the circuit of Vargha inherently operates as an inductor is scientifically incorrect based on the best analysis of applicant. Rather, the circuit of Varhga does **NOT** operate as an inductor!

The Office Action seems to believe that any transistor biased by a voltage beyond the power supply can act as a gyrator transforming a capacitance in an inductance.

This is incorrect.

Only specific arrangements of circuit elements, e.g., transistors and resistors, can so act as gyrators. Furthermore, the transistor(s) must be properly biased for the correct mode of operation. In the case of the instant invention, the transistor must be biased for the saturation mode, in which it acts as a transconductor.

By contrast, the circuit of Vargha does **not** have a gate resistor connected to its transistor, nor is its transistor biased to operate in saturation. Consequently, Vargha does not form a gyrator. However, a gyrator is necessary to transform a capacitance—in the instant invention the gate-source capacitance—into an inductance. (Nor does Vargha have the two coupled transconductors as in Ko et al., which is an alternative arrangement that could be used to form a gyrator and transform a capacitance into an inductance.)

For the transistor of Vargha to work as part of a gyrator it should operate as transconductor, which means that it must be biased, as is the instant invention, to satisfy

$V_{DS} > V_{GS} - V_{TH}$ and $V_{GS} > V_{TH}$ (saturation mode).

However, this is **not** the case in Vargha. Instead, the circuit of Varhga actually only operates as a switch. This is because the transistor of Vargha is biased to satisfy

V_DS < V_GS - V_TH (ohmic mode); or

V_GS < V_TH (off mode).

Therefore, even though at first glance Vargha may seem to resemble applicant's invention, this is merely a surface resemblance. Analysis of the circuits' actual operation reveals that Vargha really in no way resembles applicant's invention, nor does it suggest same.

Rejection Under 35 U.S.C. 103(a)

With regard to the rejection under 35 U.S.C. 103(a), the Office Action's statement to the contrary notwithstanding, one would **not** combine Vargha and to Ko et al., and it is clear that one should **not** do so.

As noted above, the biasing regimes of Vargha and Ko et al. are mutually exclusive. Either the biasing is arranged as in Vargha, so that the circuit operates as a switch, with the active element being either in Ohmic mode or off mode, or the biasing is arranged as in Ko et al., to produce a gyrator for use in an active inductor.

To do as the Office Action suggests, i.e., to insert the resistors of Ko et al. into the circuit of Vargha, would not produce an active inductor.

The Office Action's suggestion seems to be based on the similarity of the pictures and hindsight from applicant's invention, not on an actual electrical function analysis of the circuits at issue. However, the motivation of one of ordinary skill in the art would come only from a correct electrical function circuit analysis.

In the instant invention, the resistor at issue is part of the gyrator which transforms a capacitance into an inductance. The resistor is **not** for the purpose of protection. More specifically, applicant employs a) a transistor, which acts as a transconductor, and b) a gate resistor, to form a gyrator.

With regard to Ko et al., the Office Action assumes that R2, R4, R6, and R8 perform some "protection" function from a rush current from the voltage source Vdd. This appears to be incorrect. Nowhere in Ko et al. does it state that such is the function of those resistors. Additionally, there is no mention of protection or of rush current. Ascribing such resistors a protection function appears to be solely based on a sua sponte analysis by the Office Action of the figure of Ko et al. without regard for the explanation

given explicitly in Ko et al. of the function of these resistors. However, in Ko et al. it is clear from column 3, line 42 through column 4, line 12 that the function of the resistors is related to biasing the active elements of the circuit. To wit:

> The **biasing** portion 40 of FIG. 2, corresponding to the biasing portion 10 of FIG. 1, includes a fourth transistor MT4 having a drain and a source connected between a first supply power V_{dd} and the input signal V1, a third capacitor C3 connected between the input signal V1 and the gate of the fourth transistor MT4, a first resistor R1 having a first end connected to the first supply power V_{dd}., a second resistor R2 connected between a second end of the first resistor R1 and the gate of the fourth transistor MT4, a third resistor R3 having a first end connected to the second end of the first resistor R1, a fourth resistor R4 connected between a second end of the third resistor R3 and a gate of the third transistor MT3, a fifth resistor R5 having a first end connected to the second end of the third resistor R3, a sixth resistor R6 connected between the second end of the fifth resistor R5 and a gate of the second transistor MT2, a seventh resistor R7 having a first end connected to the second end of the fifth resistor R5, an eighth resistor R8 connected between the second end of the seventh resistor R7 and the gate of the first transistor MT1, and a ninth resistor R9 connected between the second end of the seventh resistor R7 and a second supply power V_{gg}.
>
> The conventional active inductors described above have a small gate capacitance, in other words, high impedance, so that a **bias** resistance of 6 k Ω or greater is required to access each gate. It is therefore difficult to use a resistor chain including the resistors R1, R3, R5, R7 and R9 shown in FIG. 2, and many pins are required. However, in the first preferred embodiment of the present invention, a **bias signal** is applied to each gate of the transistors **via the resistor chain**, and the resistors R2, R4, R6 and R8 are connected to each resistor of the resistor chain to reduce the number of **bias** pins. In the end, the first preferred embodiment of FIG. 2 can readily change the **bias** current and stabilize the bias at the same time, as described in I. D. Robertson et al., "Ultrawideband biasing of MMIC distributed amplifiers using improved active load," Electronics Letters, Vol. 27, No. 21, pp. 1907-1909 (1991). (Emphasis added)

Given that the function ascribed to the resistors by the Office Action is **not** correct, i.e., there is **no** protection function, so too the motivation ascribed to one of ordinary skill in the art to combine such resistors with the circuit of Vargha based on that function is **not** correct.

Furthermore, even if the Office Action were correct in ascribing to R2 of Ko et al. a function of protecting against a rush current from Vdd, why would one want to combine Ko et al. with Vargha, the result of which would, according to the Office Action's combination, place a greater voltage at the input to R2, thereby causing an even greater rush current. Clearly to do so is contraindicated by the Office Action's own reasoning. Moreover, it seems clear from the lack of any discussion about it in Vargha that there is

no problem with rush current in its switch circuit, and hence there is **no** motivation to introduce therein any form of "protection".

To reiterate, the resistors of Ko et al. do **NOT** serve to protect the MOSFET, but to **bias** it for proper operation as an active inductor. The Office Action's suggestion that the resistors serve an additional or alternative function of protection reads nicely and may appear, at first glance seductive in an Office Action, but it is based on a misunderstanding of the circuit in Ko et al. and a complete mischaracterization of the circuit's nature and the function of the resistors. Furthermore, one of ordinary skill in the art would readily recognize that if he were to try and "protect" the MOSFET of Vargha as suggested by the Office Action, i.e., using the alleged "protection" technique of Ko et al., that doing so would, as indicated, not result in the formation of an active inductor. Therefore, one of ordinary skill in the art would **not**, for any considered reason, combine the Vargha and Ko et al. references if merely given the Vargha and Ko et al. references. Hence there is **no** rational upon which an obviousness rejection using the Vargha and Ko et al. references can be based.

Since there is no teaching, suggestion, or motivation to combine Vargha with Ko et al., doing so is an improper basis for a rejection, and applicants claims 1-13 are allowable over Vargha and Ko et al. applicant's claims are allowable over the suggested combination.

Conclusion

It is respectfully submitted that the Office Action's rejections have been overcome and that this application is now in condition for allowance. Reconsideration and allowance are, therefore, respectfully solicited.

If, however, the Examiner still believes that there are unresolved issues, he is invited to call applicant's attorney so that arrangements may be made to discuss and resolve any such issues.

In the event that an extension of time is required for this amendment to be considered timely, and a petition therefor does not otherwise accompany this amendment, any necessary extension of time is hereby petitioned for, and the Commissioner is authorized to charge the appropriate cost of such petition to the **Lucent Technologies Deposit Account No. 12-2325**.

Respectfully,

Eduard Sackinger

By Eugene J. Rosenthal

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732-949-1857

Lucent Technologies Inc.

Date: April 21, 2003